REMARKS

Claims 2 and 16 have been amended to improve form and claim 17 has been canceled without prejudice or disclaimer. No new matter has been added by way of the present amendment. Claims 1-16 and 18-20 are now pending.

In the Office Action, the Examiner rejects claims 2, 3 and 8-15 under 35 U.S.C. § 112 second paragraph; rejects claims 1-3, 6-11 and 14-20 under 35 U.S.C. § 102(e) as being anticipated by Matsumoto et al. (U.S. Patent Application Publication No. 2003/0026346; hereinafter Matsumoto); rejects claims 4, 5 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Matsumoto in view of Poggiolini (U.S. Patent No. 6,621,617); and rejects claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Matsumoto in view of Tellado et al. (U.S. Patent No. 6,512,797; hereinafter Tellado). The applicants respectfully traverse these rejections.[1]

Rejection under 35 U.S.C. § 112, Second Paragraph

In the Office Action, claims 2, 3 and 8-15 have been rejected as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regards as the invention.

More particularly, as to claim 2, the Office Action states that claim 2 at line 4 recites the term "non-consecutive tone." The Office Action, however, contends that

[1] As Applicants' remarks with respect to the Examiner's rejections are sufficient to overcome these rejections, Applicants' silence as to assertions by the Examiner in the Office Action or certain requirements that may be applicable to such rejections (e.g., whether a reference constitutes prior art, motivation to combine references, assertions as to dependent claims, etc.) is not a concession by Applicants that such assertions are accurate or such requirements have been met, and Applicants reserve the right to analyze and dispute such assertions/requirements in the future.

claim 2 does not recite how and in which way the tones are non-consecutive and therefore, the claim is of unclear scope (Office Action, p. 2).

The applicants respectfully point out that the claim sets forth the subject matter which is sought to be patented and the claims themselves are not required to provide or show how and in which way the tones are non-consecutive. However, to expedite prosecution, claim 2 has been amended to recite that each of the N non-consecutive tones is not adjacent in a frequency domain to other ones of the N non-consecutive tones. Support for this feature is provided, for example, at page 8, paragraph 0033 of the applicants' disclosure.

The applicants respectfully submit that amended claim 2 clearly satisfies the requirements of 35 U.S.C. § 112, second paragraph. Accordingly, withdrawal of the rejection of claims 2 and 3 under 35 U.S.C. § 112, second paragraph is respectfully requested.

With respect to claims 8-15, the Office Action has not provided any reason why these claims are allegedly indefinite. Accordingly, the applicants respectfully request that the rejection of claims 8-15 under 35 U.S.C. § 112, second paragraph be withdrawn. If the rejection is maintained, the applicants respectfully request that any subsequent communication specifically point out which features of claims 8-15 are allegedly indefinite.

Rejection under 35 U.S.C. § 102(e) based on Matsumoto

Claims 1-3, 6-11 and 14-20 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Matsumoto. The rejection is respectfully traversed.

Independent claim 1 is directed to a method for transmitting data between a first device and a second device in a discrete multitone (DMT) system, the method comprising: allocating a predetermined number of bits of data for each of a plurality tones; transmitting redundant sets of data on each of a plurality of different tones, each redundant set including the predetermined number of bits of data; receiving the redundant sets of data by the second device; and identifying the data represented by the redundant sets of data using a voting scheme. Matsumoto does not disclose or suggest this combination of features.

For example, Matsumoto does not disclose or suggest identifying the data represented by the redundant sets of data using a voting scheme. The Examiner relies on paragraphs 0080 and 0114 of Matsumoto for allegedly disclosing this feature (Office Action, p. 3). The applicants respectfully disagree with the Examiner's interpretation of Matsumoto.

Matsumoto at paragraph 0080 discloses:

> For example, in the encoder in FIG. 1(a), reference numeral 1 denotes a turbo encoder which can obtain performance which is close to the Shannon limit by employing a turbo coder as an error correction code. For example, in the turbo encoder 1, two information bits and two redundant bits are output with respect to an input of two information bits. In addition, in this case, respective redundant bits are generated to make correction capabilities for the information bits uniform in the reception side.

This section describes the turbo encoder of Fig. 1(a) in which two information bits and two redundant bits are output with respect to an input of two information bits. Neither this figure nor the description thereof discloses or suggests identifying the data represented by the redundant sets of data using a voting scheme. In contrast, this portion of Matsumoto merely discloses using an error correction code for making corrections.

Matsumoto at paragraph 0114 discloses:

> In this manner, as the recursive systematic convolutional encoder (encoder) used in the turbo encoder 1, for example, as shown in FIG. 5(b), a configuration which inputs at least one of sequences of transmission data to the adder of the final stage, so that the influence of the transmission data can be more strongly reflected on redundant data. More specifically, demodulation characteristics on the reception side can be considerably improved in comparison with the prior art.

This section discloses that a recursive systematic convolutional encoder used in the turbo encoder may be utilized so that the influence of the transmission data can be reflected on redundant data. This section does not disclose or suggest identifying the data represented by the redundant sets of data using a voting scheme, as required by claim 1. In contrast, this portion of Matsumoto merely discloses using a convolutional encoder to encode data for transmission.

Moreover, the applicants note that no portion of Matsumoto even mentions a voting scheme or relates to a voting scheme. Therefore, Matsumoto cannot disclose or suggest identifying the data represented by the redundant sets of data using a voting scheme, as required by claim 1.

For at least the foregoing reasons, the applicants submit that claim 1 is not anticipated by Matsumoto. Accordingly, withdrawal of the rejection and allowance of claim 1 are respectfully requested.

Claims 2, 3, 6 and 7 depend from claim 1. Therefore, these claims are not anticipated by Matsumoto for at least the reasons given above with respect to claim 1. Moreover, these claims recite additional features not disclosed or suggested by Matsumoto.

For example, claim 2, as amended, recites that the predetermined number of bits of data comprises one bit and the plurality of different tones comprises N tones, wherein N is an odd integer, and the transmitting comprises transmitting each bit of data on each of N non-consecutive tones, wherein each of the N non-consecutive tones is not adjacent in a frequency domain to other ones of the N non-consecutive tones. Matsumoto does not disclose or suggest this combination of features.

For example, Matsumoto does not disclose or suggest the predetermined number of bits of data comprises one bit and the plurality of different tones comprises N tones, wherein N is an odd integer and that the transmitting comprises transmitting each bit of data on each of N non-consecutive tones. The Examiner relies on Matsumoto at paragraph 0179, lines 14-14 (presumably intended to be lines 14-15), paragraphs 0085, 0178, 0179, and paragraph 180, lines 2-3, for allegedly disclosing these features (Office Action, p. 3). The applicants respectfully disagree with the Examiner's interpretation of Matsumoto.

Matsumoto at paragraph 0179, lines 14-15 discloses:

> The turbo codes each constituted at least 3 bits (3 bits are used when one information bit sequence is used) are assigned to the tone sets.

This section of Matsumoto discloses the use of turbo codes consisting of at least three bits that are assigned to the tone sets. This section of Matsumoto does not disclose or suggest the predetermined number of bits of data comprises one bit and the plurality of different tones comprises N tones, wherein N is an odd integer, as recited in claim 2. In fact, Matsumoto appears to utilize consecutive tones (e.g., tone 9, tone 8.....tone 1, tone 0) (Matsumoto – paragraph 0180). Therefore, this portion of Matsumoto actually teaches

away from using N non-consecutive tones, much less that N is an odd integer, as required by claim 2.

Matsumoto at paragraph 0085 recites:

> Thereafter, the transmission data is subjected to a rate convert process by a rate converter (corresponding to a RATE-CONVERTER) 47 or 48 and subjected to a tone ordering process by the tone ordering (corresponding to TONE ORDERING) 49. On the basis of the transmission data subjected to the tone ordering process, constellation data is formed by a constellation encoder/gain scaling (corresponding to a CONSTELLATION AND GAIN SCALING) 50, and is subjected to inverse fast Fourier transform by an inverse fast Fourier transform unit (corresponding to an IFFT: Inverse Fast Fourier transform) 51.

This section of Matsumoto discloses that transmission data is subjected to a rate converter and a tone ordering processes. This section of Matsumoto does not disclose or suggest transmitting each bit of data on each of N non-consecutive tones, where N is an odd integer, as required by claim 2. In fact, this portion of Matsumoto does not include any disclosure or suggestion which may reasonably be construed as corresponding to the features recited in claim 2.

Matsumoto at paragraph 0178 recites:

> More specifically, for example, as shown in FIG. 22(a), transmission data each having bits the number of which is dependent on an S/N ratio are assigned to tone 0 to tone 9 of respective frequencies. In this case, 0-bit transmission data is assigned to tone 9, 1-bit transmission data are assigned to tone 0, tone 1, tone 7, and tone 8, 2-bit transmission data is assigned to tone 6, 3-bit transmission data is assigned to tone 2, 4-bit transmission data is assigned to tone 5, 5-bit transmission data is assigned to tone 3, and 6-bit transmission data is assigned to tone 4. The 24 bits (information bits: 16 bits and redundant bits: 8 bits) form one frame. The number of bits assigned to the tones is larger than the number of bits of the data frame buffer because redundant bits which are required for error correction are added.

Matsumoto at paragraph 0178 describes Fig. 22(a) and discloses that transmission data each having a number of bits which depends on the S/N ratio are assigned to sequential tones (i.e., tone 0, tone 1, tone 2, etc.). Neither Fig. 22(a) nor the description

thereof discloses or suggests transmitting each bit of data on each of N non-consecutive tones, where N is an odd integer, as required by claim 2.

Matsumoto at paragraph 0179 discloses:

> In this manner, one frame of the transmission data subjected to the tone ordering process is constituted as shown in, e.g., FIG. 22(b). More specifically, the tones are arranged in the descending order of the numbers of assigned bits, i.e., tone 9 (b0'), tone 0 (b1'), tone 1 (b2'), tone 7 (b3'), tone 8 (b4'), tone 6 (b5'), tone 2 (b6'), tone 5 (b7'), tone 3 (b8'), and tone 4 (b9'). Tone 9, tone 0, tone 1, and tone 7 are constituted by one tone set, tone 8, tone 6, tone 2, and tone 5 are constituted by one tone set, and tone 3 and tone 4 are constituted by one tone set. For this reason, in the fourth embodiment, the tone sets are formed by two or four tones in the descending order of the numbers of bits assigned by the tone ordering process. The turbo codes each constituted at least 3 bits (3 bits are used when one information bit sequence is used) are assigned to the tone sets. For this reason, transmission data can also be assigned with respect to a tone in which the number of bits which can be transmitted by the tone ordering process is set to be 1.

This section of Matsumoto discloses that tone sets are formed by two or four tones in the descending order of the number of bits assigned by the tone ordering process. This description does not disclose or suggest that the plurality of different tones comprises N tones, where N is an odd integer, as required by claim 2.

Matsumoto at paragraph 0180, lines 2-3 discloses:

> When a frame processed as shown in FIG. 22 is encoded in units of tone set, data d0 and dummy data d_dummy (because one information bit sequence is used)

This section of Matsumoto refers to Fig. 22 and discloses that a frame is encoded in units of tone set. Neither Fig. 22 nor the description thereof discloses or suggests transmitting each bit of data on each of N non-consecutive tones, where N is an odd integer, as required by claim 2.

Matsumoto at paragraph 0178, lines 5-6 discloses assigning various transmission data to tone 0 to tone 9. This portion of Matsumoto in no way discloses or suggests

transmitting each bit of data on each of N non-consecutive tones, where N is an odd integer, as required by claim 2.

For at least these additional reasons, the applicants submit that claim 2 is not anticipated by Matsumoto. Accordingly, withdrawal of the rejection and allowance of claim 2 are respectfully requested.

Claim 3 recites that the identifying comprises decoding the N tones, and determining the identity of a data bit represented by a redundant set of data when more than one half of the decoded N tones correspond to a particular value. The Office Action points to paragraphs 0081, 0102 and 0103 of Matsumoto for allegedly disclosing these features (Office Action, p. 4). The applicants respectfully disagree with the Examiner's interpretation of Matsumoto.

Matsumoto at paragraph 0081 discloses:

> On the other hand, in the decoder in FIG. 1(b), reference numeral 11 denotes a first decoder for calculating a logarithmic likelihood ratio from a reception signal: Lcy (corresponding to reception signals: y_2, y_1, and y_a (to be described later)), reference numerals 12 and 16 denote adders; reference numerals 13 and 14 denote interleavers, reference numeral 15 denotes a second decoder for calculating a logarithmic likelihood ratio from a reception signal: Lcy (corresponding to reception signals: y_2, y_1, and y_b (to be described later)), reference numeral 17 denotes a deinterleaver, reference numeral 18 denotes a first decision unit for deciding an output from the first decoder 15 to output an estimation value of an original information bit sequence, reference numeral 19 denotes a first R/S decoder for decoding a Reed-Solomon code to output an information bit sequence having a higher precision, reference numeral 20 denotes a second decision unit for deciding an output from the second decoder 15 to output an estimation value of an original information bit sequence, reference numeral 21 denotes a second R/S decoder for decoding a Reed-Solomon code to output an information bit sequence having a higher precision, and reference 22 denotes a third decision unit for performing hard decision of Lcy (corresponding to reception signals: y_3, y_4, . . . , (to be described later)) to output an estimation value of an original information bit sequence.

Matsumoto at paragraph 0081 refers to Fig. 1(b) and discloses that plural decoders calculate a logarithmic ratio from a reception signal. This portion of Matsumoto also discloses that decisions units decide output from the decoders. Neither Fig. 1(b) nor the description thereof discloses or suggests determining the identity of a data bit represented by a redundant set of data when more than one half of the decoded N tones correspond to a particular value, as required by claim 3.

Matsumoto at paragraph 0102 discloses:

> In the turbo decoder which receives the reception signals Lcy: y_2, y_1, y_a, and y_b, the first decoder 11 extracts the reception signals Lcy: y_2, y_1, and y_a and calculates logarithmic likelihood ratios: $L(u_{1k}')$ and $L(u_{2k}')$ of information bits (corresponding to original transmission data: u_{1k} and u_{2k}): u.sub.1k' and u_{2k} estimated from these reception signals (k represents time) . That is, in this case, the probability that u.sub.2k to the probability that u_{2k} is 0 is 0 and the probability that u_{1k} to the probability that u_{1k} is 0 is 1 are calculated. In the following description, u_{1k} and u_{2k} are simply called u_k, and u_{1k}' and u_{2k}' are simply called u_{k}'.

This section of Matsumoto discloses making decisions based on logarithmic likelihood ratios. This section of Matsumoto does not disclose or suggest determining the identity of a data bit represented by a redundant set of data when more than one half of the decoded N tones correspond to a particular value, as required by claim 3.

Matsumoto at paragraph 0103 recites:

> In FIG. 1(b), Le(uk) denotes external information, and $La(u_k)$ is prior information which is previous external information. As a decoder for calculating a logarithmic likelihood ratio, for example, a known maximum posterior probability decoder (MAP algorithm: Maximum A-Posteriori) is often used. However, for example, a known viterbi decoder may be used.

This section of Matsumoto describes Fig. 1(b) and discloses that external information is used by a decoder for calculating a logarithmic likelihood ratio. Neither the figure nor the description thereof discloses or suggests determining the identity of a

data bit represented by a redundant set of data when more than one half of the decoded N tones correspond to a particular value, as required by claim 3.

For at least these additional reasons, the applicants submit that claim 3 is not anticipated by Matsumoto. Accordingly, withdrawal of the rejection and allowance of claim 3 are respectfully requested.

Claim 6 is dependent on claim 1 and recites that the transmitting redundant sets of data is performed during a training period. The Examiner relies on Matsumoto at paragraph 0083 and states that Matsumoto inherently discloses sending data for testing before starting the actual transmission (Office Action, p. 4). The applicants respectfully disagree.

Matsumoto at paragraph 0083 discloses:

> FIG. 2 is a diagram showing the configuration of a transmission system of a communication apparatus according to the present invention. In FIG. 2, in the transmission system, transmission data is multiplexed by a multiplex/sync control (corresponding to a MUX/SYNC CONTROL in FIG. 2) 41, an error detection code is added to the multiplexed transmission data by a cyclic redundancy check (corresponding to a CRC: Cyclic redundancy check) 42 or 43. The resultant transmission data is added with an FEC code and subjected to a scramble process by forward an error correction (corresponding to a SCRAM & an FEC) 44 or 45.

This section of Matsumoto describes Fig. 2, which is a diagram showing the configuration of a transmission system of Matsumoto. This section further discloses that the data is multiplexed by a multiplex/sync control and that an error detection code is added to the multiplex transmission data. Neither Fig. 2 nor the description thereof discloses or suggests that transmitting redundant sets of data is performed during a training period, as required by claim 6.

The Examiner at page 4 of the Office Action alleges that "it is inherent that the system will send data for testing procedure before starting the actual transmission."

M.P.E.P. § 2112 requires the Examiner, when relying on the theory of inherency, to provide "a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flow from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). The Examiner, however, has not provided the necessary showing articulated in M.P.E.P. § 2112 to support the inherency assertion. Contrary to the Examiner's allegation, the mere fact that Matsumoto discloses sending error correction data in no way supports the allegation that transmitting redundant sets of data during a training period is inherent in Mastumoto.

For at least these additional reasons, the applicants submit that claim 6 is not anticipated by Matsumoto. Accordingly, withdrawal of the rejection and allowance of claim 6 are respectfully requested.

Claim 7 is dependent on claim 1 and recites that the predetermined number of bits comprises a plurality of bits and the plurality of tones comprises N non-consecutive tones. The Office Action states that Matsumoto discloses these features and points to paragraphs 0177 and 0179 for support (Office Action, p. 4). The applicants respectfully disagree.

For example, Matsumoto at paragraph 0177 discloses:

> For example, when data communication by a DMT modulation/demodulation scheme is performed by using a known transmission path such as a telephone line or the like, on the transmission side, a tone ordering process, i.e., a process (a transmission rate is determined by this process) of assigning transmission data each having bits the number of which can be transmitted to a plurality of tones (multi-carrier) in a preset frequency band on the basis of an S/N (signal-to-noise ratio) ratio is performed.

Matsumoto at paragraph 0179 discloses:

> In this manner, one frame of the transmission data subjected to the tone ordering process is constituted as shown in, e.g., FIG. 22(b). More specifically, the tones are arranged in the descending order of the numbers of assigned bits, i.e., tone 9 (b0'), tone 0 (b1'), tone 1 (b2'), tone 7 (b3'), tone 8 (b4'), tone 6 (b5'), tone 2 (b6'), tone 5 (b7'), tone 3 (b8'), and tone 4 (b9'). Tone 9, tone 0, tone 1, and tone 7 are constituted by one tone set, tone 8, tone 6, tone 2, and tone 5 are constituted by one tone set, and tone 3 and tone 4 are constituted by one tone set. For this reason, in the fourth embodiment, the tone sets are formed by two or four tones in the descending order of the numbers of bits assigned by the tone ordering process. The turbo codes each constituted at least 3 bits (3 bits are used when one information bit sequence is used) are assigned to the tone sets. For this reason, transmission data can also be assigned with respect to a tone in which the number of bits which can be transmitted by the tone ordering process is set to be 1.

These sections of Matsumoto disclose communication by a conventional DMT scheme and a tone ordering process. These sections of Matsumoto in no way disclose or suggest that the predetermined number of bits comprises a plurality of bits and the plurality of tones comprises N non-consecutive tones, as required by claim 7.

Claim 7 also recites that the identifying comprises decoding the N non-consecutive tones to identify the plurality of bits, and voting on the identity of each of the plurality of bits on a bit-by-bit basis. The Office Action states that Matsumoto discloses these features and relies upon paragraph 0102 and 0103 for support (Office Action, p. 4).

Paragraphs 0102 and 0103 of Matsumoto have been reproduced above. These portions of Matsumoto disclose that external information is used by a decoder for calculating a logarithmic likelihood ratio and making decisions based on the logarithmic likelihood ratio. These portions of Matsumoto do not disclose or suggest any voting scheme, much less that that the identifying comprises decoding the N non-consecutive tones to identify the plurality of bits, and voting on the identity of each of the plurality of bits on a bit-by-bit basis, as recited in claim 7.

For at least these additional reasons, the applicants submit that claim 7 is not anticipated by Matsumoto. Accordingly, withdrawal of the rejection and allowance of claim 7 are respectfully requested.

Independent claim 8 recites a first device configured to communicate using discrete multitone (DMT) modulation, comprising: logic configured to allocate a first number of bits of data for each of a plurality of tones; logic configured to receive a redundant set of data via a plurality of tones from a second device; and logic configured to identify the data based on a voting scheme. The applicants respectfully submit that Matsumoto does not disclose or suggest these features.

For example, Matsumoto does not disclose or suggest logic configured to identify the data based on a voting scheme. The Examiner relies on Matsumoto at paragraphs 0081 and 0106 for allegedly disclosing this feature, (Office Action, p. 5).

Paragraph 0081 of Matsumoto has been reproduced above. This section of Matsumoto discloses calculating a logarithmic likelihood ratio of a reception signal via plural decoders and decision units to output an estimation value of an original information bit sequence. This section in no way discloses or suggests logic configured to identify the data based on a voting scheme, as required by claim 8.

Matsumoto at paragraph 0106 discloses:

> In the turbo decoder, the above process is repeatedly executed a predetermined number of times (the number of times of iteration), so that a logarithmic likelihood ratio having high precision is calculated. The first decision unit 18 and the second decision unit 20 decide signals on the basis of the logarithmic likelihood ratio to estimate original transmission data. More specifically, for example, when the logarithmic likelihood ratio is given by "$L(u_k)>0$", the estimated information bit: u_k is decided as 0. When the logarithmic likelihood ratio is given by "$L(u_k)$.ltoreq.0", the estimated information bit: u_k is decided as 0. The reception signals Lcy: y_3, y_4, . . . which are simultaneously received are subjected to hard decision by using the third decision unit 22.

This section of Matsumoto discloses a turbo decoder that repeats a calculation a number of times to generate a logarithmic likelihood ratio having high precision. This section in no way discloses or suggests logic configured to identify the data based on a voting scheme, as recited in claim 8.

For at least the foregoing reasons, the applicants submit that claim 8 is not anticipated by Matsumoto. Accordingly, withdrawal of the rejection and allowance of claim 8 are respectfully requested.

Claims 9-11 and 14-15 depend from claim 8. Therefore, these claims are not anticipated by Matsumoto for at least the reasons given above with respect to claim 8. Moreover, these claims recite additional features not disclosed or suggested by Matsumoto

For example, claim 10 recites features similar to (yet of different scope than) features described above with respect to claim 3. The applicants submit that claim 10 is not anticipated by Matsumoto for at least reasons similar to reasons given above with respect to claim 3. For at least these additional reasons, withdrawal of the rejection and allowance of claim 10 are respectfully requested.

Claims 11 and 14 recite features similar to (yet of different scope than) features described above with respect to claim 6. The applicants submit that these claims are not anticipated by Matsumoto for at least reasons similar to reasons given above with respect to claim 6. For at least these additional reasons, withdrawal of the rejection and allowance of claims 11 and 14 are respectfully requested.

Claim 15 recite features similar to (yet of different scope than) features described above with respect to claim 7. The applicants submit that these claims are not anticipated

by Matsumoto for at least reasons similar to reasons given above with respect to claim 7. For at least these additional reasons, withdrawal of the rejection and allowance of claim 15 are respectfully requested.

Amended independent claim 16 recites features previously recited in claim 17. For example, amended claim 16 recites a first device that includes a transmitter and a receiver. The receiver is configured to receive data transmitted on the first number of tones from the second device, decode the data received on the first number of tones, and determine the identity of the received data based on a determination that a bit or group of bits is equal to a first value when more than one half of the decoded first number of tones correspond to the first value.

These latter features are similar to features recited in claim 3. The applicants respectfully submit that claim 16 is not anticipated by Matsumoto for at least reasons similar to those discussed above with respect to claim 3. Accordingly, withdrawal of the rejection and allowance of claim 16 are respectfully requested.

Claims 18-20 depend from claim 16. Therefore, these claims are not anticipated by Matsumoto for at least the reasons given above with respect to claim 16. Moreover, these claims recite additional features not disclosed or suggested by Matsumoto.

For example, claims 18 and 19 recite features similar to (yet possibly of different scope than) features discussed above with respect to claim 2. The applicants submit that these claims are not anticipated by Matsumoto for at least reasons similar to reasons given above with respect to claim 2. For at least these additional reasons, withdrawal of the rejection and allowance of claims 18 and 19 are respectfully requested.

Claim 20 recites that the first number of tones are separated by a maximum number of tones based on a total number of tones used in the DMT system. The Office Action states that Matsumoto discloses this feature and points to paragraph 0042 for support (Office Action, p. 8). The applicants respectfully disagree.

Matsumoto at paragraph 0042 discloses:

> In the communication apparatuses according to the above-mentioned aspects, the turbo encoder comprises an interleaver. Assume that M is a prime number representing a value on an abscissa, N is a natural number representing a value on an ordinate, m is an integer, Ti is a number of tones, S_{turbo} is a number of DMT symbols, and Tail is a number of bits for a terminating process. Then, the interleaver stores the information bit sequences in input buffers the number of which is given by $M \geq 2^m + 1$"x" N=[{Ti xS_{turbo})-Tail}/2]/M; shifts a random sequence of specific (M-1) bits generated by the prime number bit by bit in units of rows to generate random sequences of (M-1) types, maps minimum values on Mth bits of the respective rows in all the random sequences, makes mapping patterns of the Mth and subsequent rows equal to the mapping patterns of the first and subsequent rows to generate an MxN mapping pattern; maps information bit sequences each having an interleaving length on the MxN mapping pattern; and reads the information bit sequences subjected to mapping in units of columns to output the information bit sequences to the second recursive systematic convolutional encoder.

This section describes a turbo encoder that generates mappings and outputs information bit sequences. This portion of Matsumoto in no way discloses or suggests that the first number of tones are separated by a maximum number of tones based on a total number of tones used in the DMT system, as recited in claim 20.

For at least these additional reasons, withdrawal of the rejection and allowance of claim 20 are respectfully requested.

Rejection under 35 U.S.C. § 103(a) based on Matsumoto and Poggiolini

Claims 4, 5 and 12 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Matsumoto in view Poggiolini. The rejection is respectfully traversed.

Claim 4, 5 and 12 variously depend from claims 1 and 8 . While not acquiescing in the Examiner's allegations with respect to claims 4, 5 and 12, the applicants submit that the disclosure of Poggiolini does not remedy the deficiencies in the disclosure of Matsumoto set forth above with respect to claims 1 and 8. Accordingly, withdrawal of the rejection and allowance of claims 4, 5 and 12 are respectfully requested.

Rejection under 35 U.S.C. § 103(a) based on Matsumoto and Tellado

Claim 13 has been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Matsumoto in view Tellado. The rejection is respectfully traversed.

Claim 13 depends from claim 8. While not acquiescing in the Examiner's allegations with respect to claim 13, the applicants submit that the disclosure of Tellado does not remedy the deficiencies in the disclosure of Matsumoto set forth above with respect to claim 8. Accordingly, withdrawal of the rejection and allowance of claim 13 are respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, the applicants respectfully request the Examiner's reconsideration of this application, and the timely allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

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